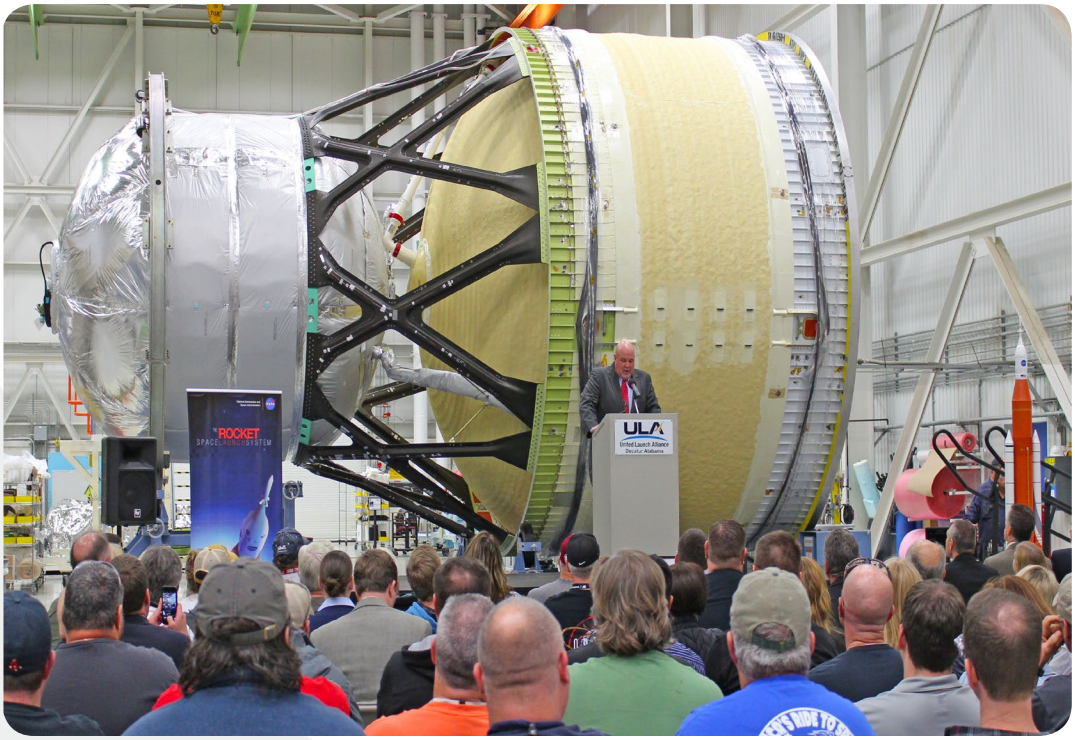
National Aeronautics and Space Administration

NOVEMBER 2015

SPACE LAUNCH SYSTEM HIGHLIGHTS

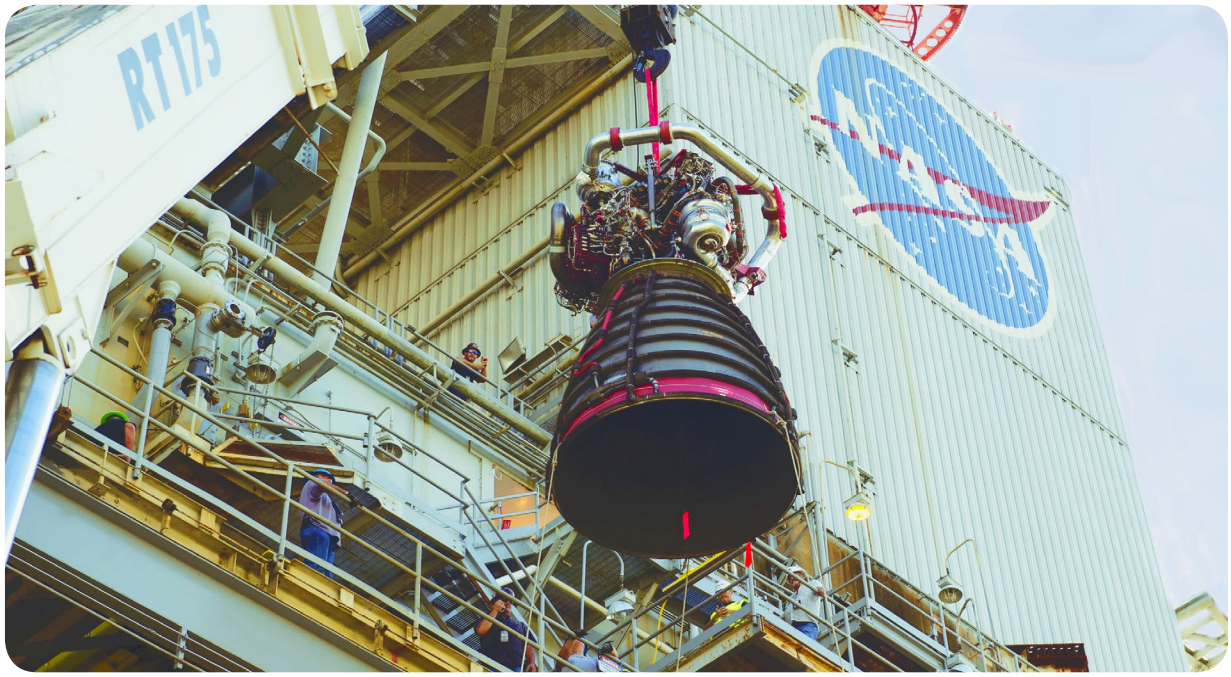
NASA Marks Completion of Test Version of Key SLS Propulsion System

A structural test article of the interim cryogenic propulsion stage (ICPS) for the SLS **was completed** at United Launch Alliance in Decatur, Alabama, prior to handover to The Boeing Company of Chicago. The ICPS structural test article ultimately will move to NASA's Marshall Space Flight Center in Huntsville, Alabama, where it will join other structural test articles and simulators that make up the upper portion of the rocket. Engineers will stack the structural test articles and move the 56-foot-tall structure to a test stand to verify the integrity of the hardware and ensure it can withstand the loads it may experience during flight. *(ULA)*



Getting Ready to Fly

NASA took the next big step Nov. 4 on the journey to Mars by placing the first RS-25 flight engine **on the A-1 test stand** at the agency's Stennis Space Center near Bay St. Louis, Mississippi. The engine will be tested in the first part of 2016 to certify it for use on SLS. *(NASA/ Stennis)*



AMRO Fabricating Corp. Lining up Panels for NASA's Space Launch System

Teams at AMRO Fabricating Corp. in South El Monte, California, show completed flight and structural test article hardware panels, arranged in order, for each section of SLS. AMRO is an industry partner helping build panels for the SLS core stage, launch vehicle stage adapter (LVSA) and Orion spacecraft. The panels, from bottom to top, represent the SLS engine section, liquid hydrogen tank, intertank, liquid oxygen tank, forward skirt, LVSA and Orion. *(AMRO)*

NASA Awards Contract to Restart Development of Engines to Power Agency's Journey to Mars

NASA selected Aerojet Rocketdyne of Sacramento, California, to restart production of the RS-25 engine for the agency's Space Launch System (SLS), the most powerful rocket in the world, and deliver a certified engine. SLS will use four RS-25 engines to carry the agency's Orion spacecraft and launch explorers on deep space missions, including to an asteroid placed in lunar orbit and ultimately to Mars.

Part of NASA's strategy to minimize costs of developing the SLS rocket was to leverage the assets, capabilities, and experience of the Space Shuttle Program, so the first four missions will be flown using 16 existing shuttle engines that have been upgraded.

Under the $1.16 billion contract, Aerojet Rocketdyne will modernize the space shuttle heritage engine to make it more affordable and expendable for SLS. The contract runs November 2015 and continues through Sept. 30, 2024.

The new RS-25 engine developed under this contract will have fewer parts and welds and will be certified to a higher operational thrust level. The new engine benefits from improvements in materials and manufacturing techniques such as five-axis milling machines, 3-D manufacturing and digital X-rays.

The contract restarts the firm's production capability including furnishing the necessary management, labor, facilities, tools, equipment and materials required for this effort, implementing modern fabrication processes and affordability improvements, and producing hardware required for development and certification testing.

The contract also allows for a potential future modification that would enable NASA to order six flight engines.

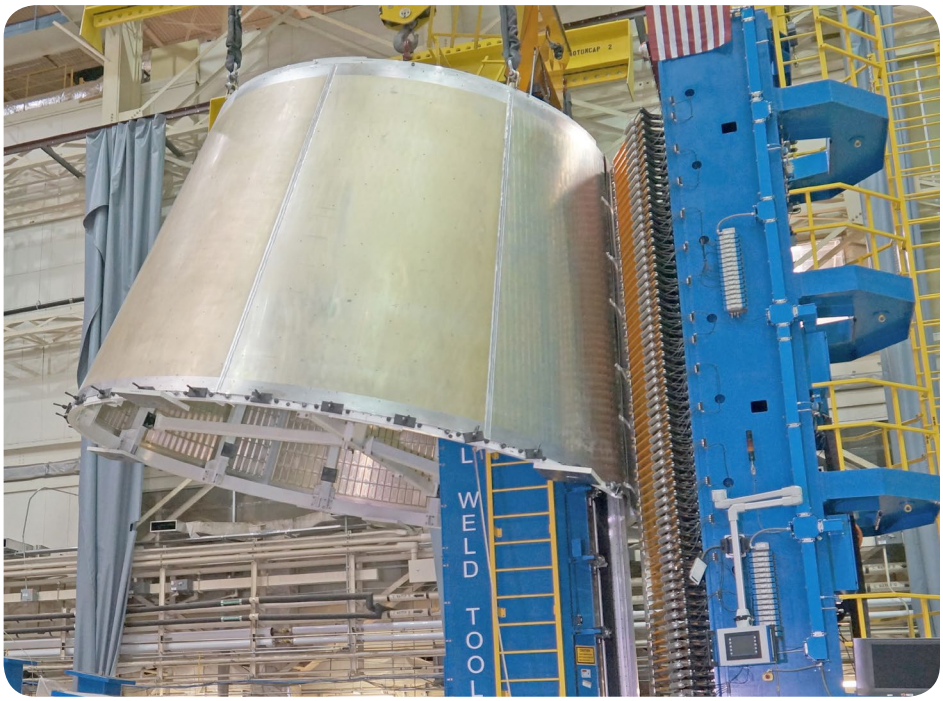
NASA's Marshall Space Flight Center in Huntsville, Alabama, manages the SLS Program for the agency. Engine testing will be performed at NASA's Stennis Space Center in Mississippi and the SLS will launch from NASA's Kennedy Space Center in Florida.

Faces of SLS

Meet **Janine Cuevas**. *(NASA/MSFC)*

Progress Continues on Test Version of SLS Adapter

The forward cone for a test version of the SLS **launch vehicle stage adapter** (LVSA) is lifted out of a weld tool following completion of eight vertical welds on the hardware at the agency's Marshall Space Flight Center in Huntsville, Alabama. The forward and aft rings also have been completed for the structural test article. The LVSA will connect two major sections — the **core stage** and the **interim cryogenic propulsion stage** (ICPS) — of the SLS. The LVSA structural test article will be stacked with other prototypes of the upper part of the rocket and tested in early 2016 at Marshall to verify the integrity of the hardware and ensure it can withstand the loads it may experience during flight. Teledyne Brown Engineering of Huntsville is the prime contractor on the LVSA work. Watch a **video** on the latest progress. *(NASA/MSFC)*



No Small Steps

There are no small steps when it comes to NASA's journey to Mars. Read about it, and watch the first video in a series on the topic, in "**Rocketology**." *(NASA)*

On the Road...

Participating in a panel at the Oct. 28 Wernher von Braun Memorial Symposium in Huntsville are, from left, Bill Hill, NASA assistant deputy associate administrator for Exploration Systems Development; John Honeycutt, manager of the Space Launch System Program; Jennifer Kunz, deputy manager for NASA's Ground Systems Development and Operations Program; and Paul Marshall, assistant program manager for the Orion Program. *(NASA/MSFC)*

SLS was part of the Nov. 19-20 National Council of Teachers of Mathematics Regional Conference in Nashville, Tennessee. Some 2,500 attendees came by the NASA booth to learn more about the rocket and the journey to Mars. *(NASA/MSFC)*

SLS in the News:

AP: **NASA Makes Strides toward Journey to Mars**

NASASpaceflight.com: **New SLS test stands rise out of the ground at Marshall**

Aviation Week: **Big SLS Rocket Could Help Scientists Answer Big Questions**

SLS on Deck:

- Weldall vendor visit
- Work continues on hardware for second booster qualification test
- Confidence welding on Vertical Assembly Center

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